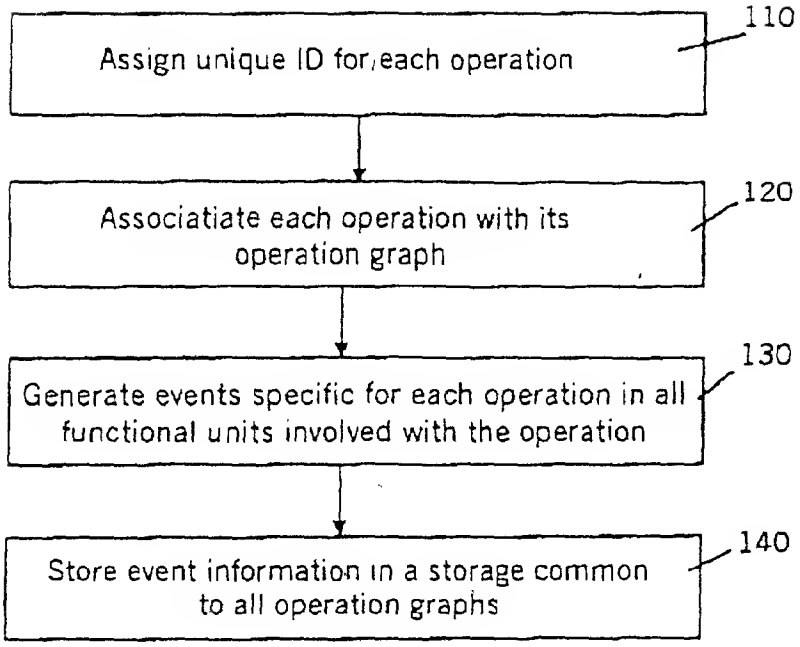
Assign unique ID for each operation
110
Associatiate each operation with its operation graph
120
Generate events specific for each operation in all functional units involved with the operation
130
Store event information in a storage common to all operation graphs
140

FIG. 1

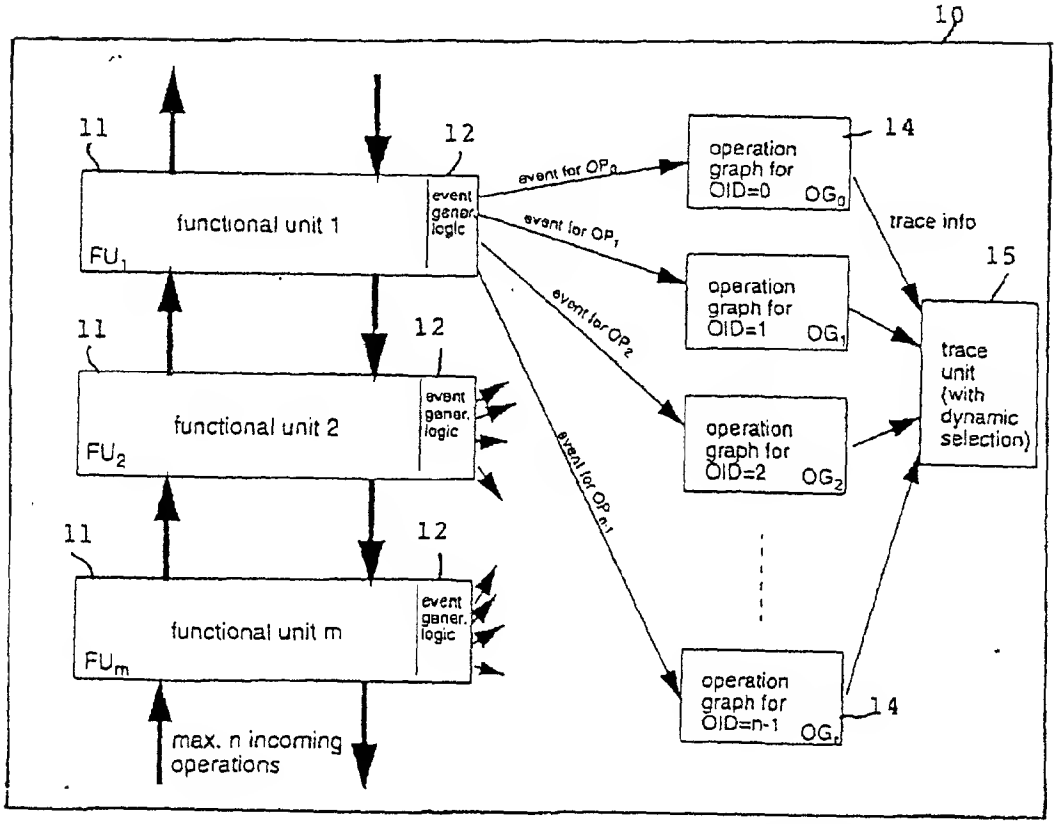
10
11
12
functional unit 1
FU1
event gener. logic
event for OP0
operation graph for OID=0
OG0
14
trace info
15
event for OP1
operation graph for OID=1
OG1
functional unit 2
FU2
event for OP2
operation graph for OID=2
OG2
trace unit (with dynamic selection)
functional unit m
FUm
event for OPn-1
operation graph for OID=n-1
OGn-1
max. n incoming operations

FIG. 2

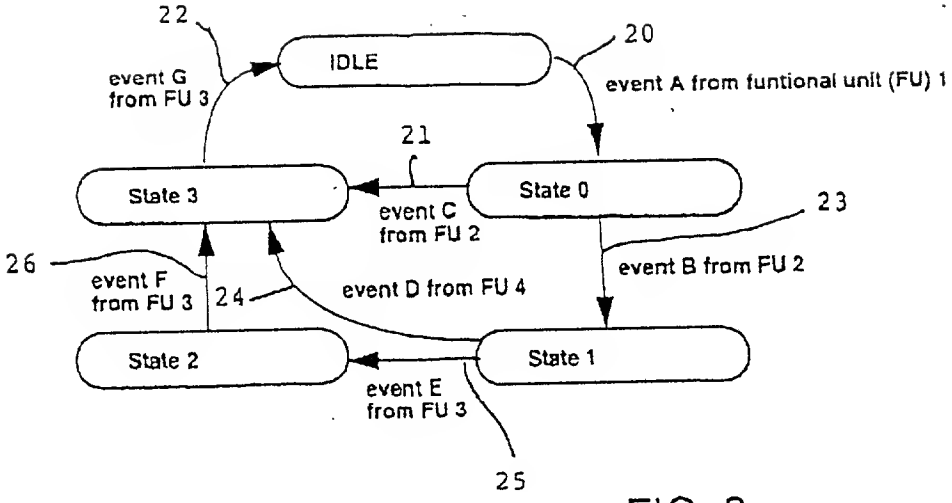
22
IDLE
20
event G
from FU 3
event A from funtional unit (FU) 1
21
State 3
State 0
23
event C
from FU 2
26
event F
from FU 3
24
event D from FU 4
event B from FU 2
State 2
State 1
event E
from FU 3
25

FIG. 3

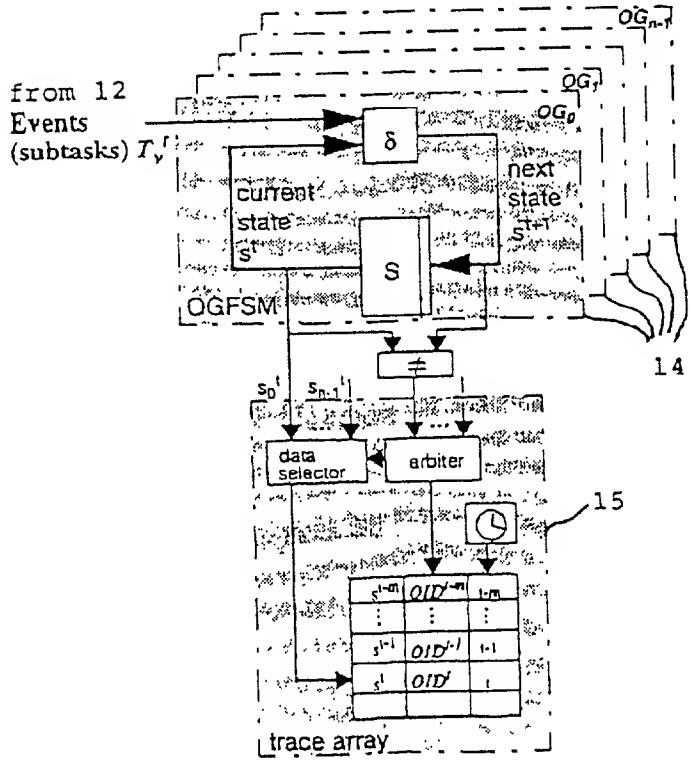
from 12
Events
(subtasks) T_v
δ
current
state
s^t
next
state
s^{t+1}
S
OGFSM
OG_{n-1}
OG_1
OG_0
14
≠
s_0^t
s_{n-1}^t
data
selector
arbiter
15
trace array

FIG. 4

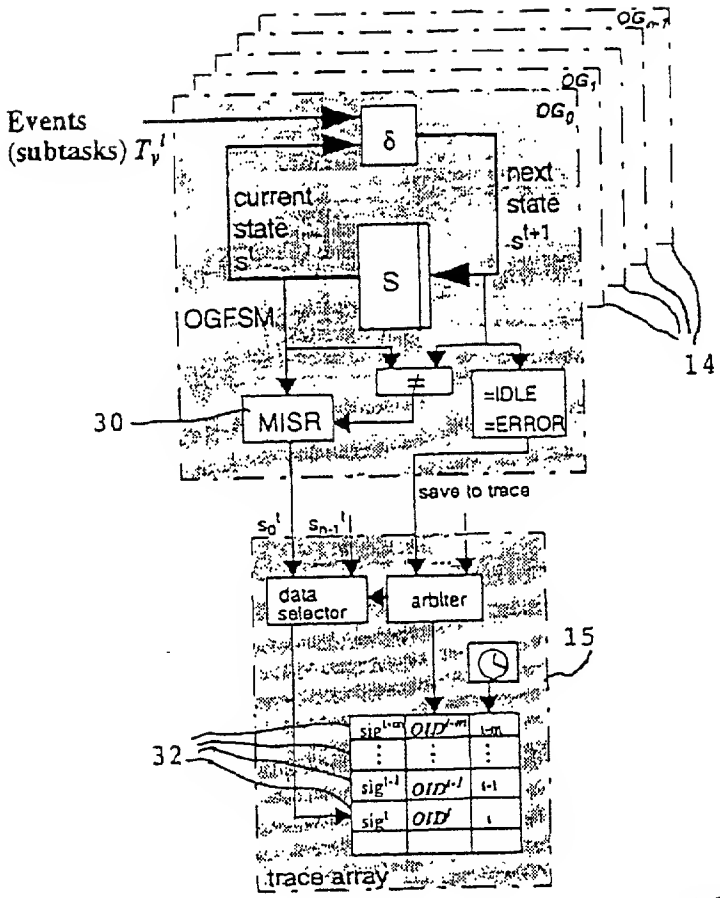
Events
(subtasks) T_v^l
δ
current
state
s^l
next
state
s^{l+1}
S
OGFSM
≠
=IDLE
=ERROR
MISR
30
14
save to trace
s_0^l
s_{n-1}^l
data
selector
arbiter
15
32
trace array

FIG. 5

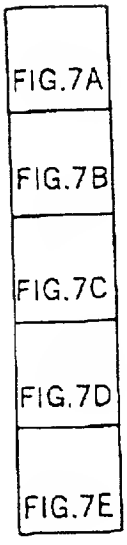
FIG.7A
FIG.7B
FIG.7C
FIG.7D
FIG.7E

FIG. 7

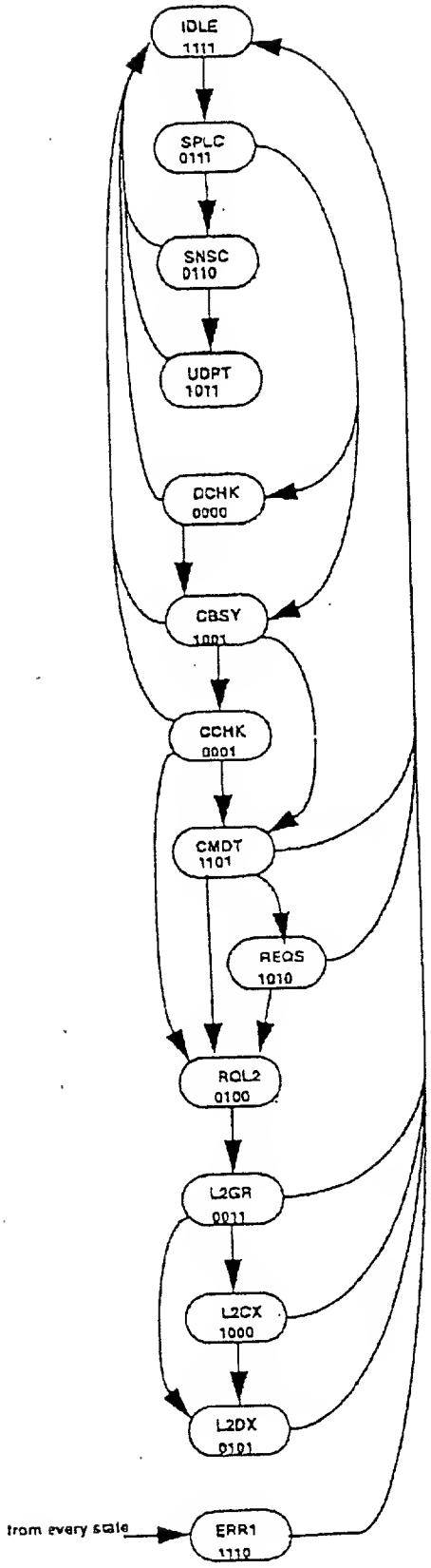
IDLE
1111
SPLC
0111
SNSC
0110
UDPT
1011
DCHK
0000
CBSY
1001
CCHK
0001
CMDT
1101
REQS
1010
RQL2
0100
L2GR
0011
L2CX
1000
L2DX
0101
from every state
ERR1
1110

FIG. 6

seq #	error type	MISR value	state sequence
0		275	SPLC IDLE
1	type1	235	SPLC ERR1
2		1DA	SPLC SNSC IDLE
3	type2	035	SPLC SNSC
4	type1	19A	SPLC SNSC ERR1
5		1AD	SPLC SNSC UPDT IDLE
6	type2	0DA	SPLC SNSC UPDT
7	type1	1ED	SPLC SNSC UPDT ERR1
8		31A	SPLC DCHK IDLE
9	type2	1B5	SPLC DCHK
10	type1	35A	SPLC DCHK ERR1
11		08D	SPLC DCHK CBSY IDLE
12	type2	29A	SPLC DCHK CBSY
13	type1	0CD	SPLC DCHK CBSY ERR1
14		046	SPLC DCHK CBSY CCHK IDLE
15	type2	30D	SPLC DCHK CBSY CCHK
16	type1	006	SPLC DCHK CBSY CCHK ERR1
17		1A3	SPLC DCHK CBSY CCHK CMDT IDLE
18	type2	0C6	SPLC DCHK CBSY CCHK CMDT
19	type1	1E3	SPLC DCHK CBSY CCHK CMDT ERR1
20		3B1	SPLC DCHK CBSY CCHK CMDT REQS IDLE
21	type2	0E3	SPLC DCHK CBSY CCHK CMDT REQS
22	type1	3F1	SPLC DCHK CBSY CCHK CMDT REQS ERR1
23		178	SPLC DCHK CBSY CCHK CMDT REQS RQL2 IDLE
24	type2	171	SPLC DCHK CBSY CCHK CMDT REQS RQL2
25		2FC	SPLC DCHK CBSY CCHK CMDT REQS RQL2 L2GR IDLE
26	type2	278	SPLC DCHK CBSY CCHK CMDT REQS RQL2 L2GR
27	type1	2BC	SPLC DCHK CBSY CCHK CMDT REQS RQL2 L2GR ERR1
28		25E	SPLC DCHK CBSY CCHK CMDT REQS RQL2 L2GR L2CX IDLE
29	type2	33C	SPLC DCHK CBSY CCHK CMDT REQS RQL2 L2GR L2CX
30		1AF	SPLC DCHK CBSY CCHK CMDT REQS RQL2 L2GR L2CX L2DX IDLE
31	type2	0DE	SPLC DCHK CBSY CCHK CMDT REQS RQL2 L2GR L2CX L2DX
32	type1	1EF	SPLC DCHK CBSY CCHK CMDT REQS RQL2 L2GR L2CX L2DX ERR1
33	type1	21E	SPLC DCHK CBSY CCHK CMDT REQS RQL2 L2GR L2CX ERR1
34		3FE	SPLC DCHK CBSY CCHK CMDT REQS RQL2 L2GR L2DX IDLE
35	type2	07C	SPLC DCHK CBSY CCHK CMDT REQS RQL2 L2GR L2DX
36	type1	3BE	SPLC DCHK CBSY CCHK CMDT REQS RQL2 L2GR L2DX ERR1
37	type1	138	SPLC DCHK CBSY CCHK CMDT REQS RQL2 ERR1
38		071	SPLC DCHK CBSY CCHK CMDT RQL2 IDLE
39	type2	363	SPLC DCHK CBSY CCHK CMDT RQL2
40		078	SPLC DCHK CBSY CCHK CMDT RQL2 L2GR IDLE
41	type2	371	SPLC DCHK CBSY CCHK CMDT RQL2 L2GR

FIG. 7A

seq #	error type	MISR value	state sequence
42	type1	038	SPLC DCHK CBSY CCHK CMDT RQL2 L2GR ERR1
43		11C	SPLC DCHK CBSY CCHK CMDT RQL2 L2GR L2CX IDLE
44	type2	1B8	SPLC DCHK CBSY CCHK CMDT RQL2 L2GR L2CX
45		00E	SPLC DCHK CBSY CCHK CMDT RQL2 L2GR L2CX L2DX IDLE
46	type2	39C	SPLC DCHK CBSY CCHK CMDT RQL2 L2GR L2CX L2DX
47	type1	04E	SPLC DCHK CBSY CCHK CMDT RQL2 L2GR L2CX L2DX ERR1
48	type1	15C	SPLC DCHK CBSY CCHK CMDT RQL2 L2GR L2CX ERR1
49		0BC	SPLC DCHK CBSY CCHK CMDT RQL2 L2GR L2DX IDLE
50	type2	2F8	SPLC DCHK CBSY CCHK CMDT RQL2 L2GR L2DX
51	type1	0FC	SPLC DCHK CBSY CCHK CMDT RQL2 L2GR L2DX ERR1
52	type1	031	SPLC DCHK CBSY CCHK CMDT RQL2 ERR1
53		083	SPLC DCHK CBSY CCHK RQL2 IDLE
54	type2	286	SPLC DCHK CBSY CCHK RQL2
55		201	SPLC DCHK CBSY CCHK RQL2 L2GR IDLE
56	type2	383	SPLC DCHK CBSY CCHK RQL2 L2GR
57	type1	241	SPLC DCHK CBSY CCHK RQL2 L2GR ERR1
58		220	SPLC DCHK CBSY CCHK RQL2 L2GR L2CX IDLE
59	type2	3C1	SPLC DCHK CBSY CCHK RQL2 L2GR L2CX
60		190	SPLC DCHK CBSY CCHK RQL2 L2GR L2CX L2DX IDLE
61	type2	0A0	SPLC DCHK CBSY CCHK RQL2 L2GR L2CX L2DX
62	type1	1D0	SPLC DCHK CBSY CCHK RQL2 L2GR L2CX L2DX ERR1
63	type1	260	SPLC DCHK CBSY CCHK RQL2 L2GR L2CX ERR1
64		380	SPLC DCHK CBSY CCHK RQL2 L2GR L2DX IDLE
65	type2	081	SPLC DCHK CBSY CCHK RQL2 L2GR L2DX
66	type1	3C0	SPLC DCHK CBSY CCHK RQL2 L2GR L2DX ERR1
67	type1	0C3	SPLC DCHK CBSY CCHK RQL2 ERR1
68		1C6	SPLC DCHK CBSY CMDT IDLE
69	type2	00D	SPLC DCHK CBSY CMDT
70	type1	186	SPLC DCHK CBSY CMDT ERR1
71		183	SPLC DCHK CBSY CMDT REQS IDLE
72	type2	086	SPLC DCHK CBSY CMDT REQS
73	type1	1C3	SPLC DCHK CBSY CMDT REQS ERR1
74		061	SPLC DCHK CBSY CMDT REQS RQL2 IDLE
75	type2	343	SPLC DCHK CBSY CMDT REQS RQL2
76		070	SPLC DCHK CBSY CMDT REQS RQL2 L2GR IDLE
77	type2	361	SPLC DCHK CBSY CMDT REQS RQL2 L2GR
78	type1	030	SPLC DCHK CBSY CMDT REQS RQL2 L2GR ERR1
79		118	SPLC DCHK CBSY CMDT REQS RQL2 L2GR L2CX IDLE
80	type2	1B0	SPLC DCHK CBSY CMDT REQS RQL2 L2GR L2CX
81		00C	SPLC DCHK CBSY CMDT REQS RQL2 L2GR L2CX L2DX IDLE
82	type2	398	SPLC DCHK CBSY CMDT REQS RQL2 L2GR L2CX L2DX
83	type1	04C	SPLC DCHK CBSY CMDT REQS RQL2 L2GR L2CX L2DX ERR1

FIG. 7B

seq #	error type	MISR value	state sequence
84	type1	158	SPLC DCHK CBSY CMDT REQS RQL2 L2GR L2CX ERR1
85		0B8	SPLC DCHK CBSY CMDT REQS RQL2 L2GR L2DX IDLE
86	type2	2F0	SPLC DCHK CBSY CMDT REQS RQL2 L2GR L2DX
87	type1	0F8	SPLC DCHK CBSY CMDT REQS RQL2 L2GR L2DX ERR1
88	type1	021	SPLC DCHK CBSY CMDT REQS RQL2 ERR1
89		243	SPLC DCHK CBSY CMDT RQL2 IDLE
90	type2	306	SPLC DCHK CBSY CMDT RQL2
91		161	SPLC DCHK CBSY CMDT RQL2 L2GR IDLE
92	type2	143	SPLC DCHK CBSY CMDT RQL2 L2GR
93	type1	121	SPLC DCHK CBSY CMDT RQL2 L2GR ERR1
94		390	SPLC DCHK CBSY CMDT RQL2 L2GR L2CX IDLE
95	type2	0A1	SPLC DCHK CBSY CMDT RQL2 L2GR L2CX
96		348	SPLC DCHK CBSY CMDT RQL2 L2GR L2CX L2DX IDLE
97	type2	110	SPLC DCHK CBSY CMDT RQL2 L2GR L2CX L2DX
98	type1	308	SPLC DCHK CBSY CMDT RQL2 L2GR L2CX L2DX ERR1
99	type1	3D0	SPLC DCHK CBSY CMDT RQL2 L2GR L2CX ERR1
100		230	SPLC DCHK CBSY CMDT RQL2 L2GR L2DX IDLE
101	type2	3E1	SPLC DCHK CBSY CMDT RQL2 L2GR L2DX
102	type1	270	SPLC DCHK CBSY CMDT RQL2 L2GR L2DX ERR1
103	type1	203	SPLC DCHK CBSY CMDT RQL2 ERR1
104		23A	SPLC CBSY IDLE
105	type2	3F5	SPLC CBSY
106	type1	27A	SPLC CBSY ERR1
107		11D	SPLC CBSY CCHK IDLE
108	type2	1BA	SPLC CBSY CCHK
109	type1	15D	SPLC CBSY CCHK ERR1
110		30E	SPLC CBSY CCHK CMDT IDLE
111	type2	19D	SPLC CBSY CCHK CMDT
112	type1	34E	SPLC CBSY CCHK CMDT ERR1
113		2E7	SPLC CBSY CCHK CMDT REQS IDLE
114	type2	24E	SPLC CBSY CCHK CMDT REQS
115	type1	2A7	SPLC CBSY CCHK CMDT REQS ERR1
116		1D3	SPLC CBSY CCHK CMDT REQS RQL2 IDLE
117	type2	027	SPLC CBSY CCHK CMDT REQS RQL2
118		2A9	SPLC CBSY CCHK CMDT REQS RQL2 L2GR IDLE
119	type2	2D3	SPLC CBSY CCHK CMDT REQS RQL2 L2GR
120	type1	2E9	SPLC CBSY CCHK CMDT REQS RQL2 L2GR ERR1
121		074	SPLC CBSY CCHK CMDT REQS RQL2 L2GR L2CX IDLE
122	type2	369	SPLC CBSY CCHK CMDT REQS RQL2 L2GR L2CX
123		0BA	SPLC CBSY CCHK CMDT REQS RQL2 L2GR L2CX L2DX IDLE
124	type2	2F4	SPLC CBSY CCHK CMDT REQS RQL2 L2GR L2CX L2DX
125	type1	0FA	SPLC CBSY CCHK CMDT REQS RQL2 L2GR L2CX L2DX ERR1

FIG. 7C

seq #	error type	MISR value	state sequence
126	type1	034	SPLC CBSY CCHK CMDT REQS RQL2 L2GR L2CX ERR1
127		1D4	SPLC CBSY CCHK CMDT REQS RQL2 L2GR L2DX IDLE
128	type2	029	SPLC CBSY CCHK CMDT REQS RQL2 L2GR L2DX
129	type1	194	SPLC CBSY CCHK CMDT REQS RQL2 L2GR L2DX ERR1
130	type1	193	SPLC CBSY CCHK CMDT REQS RQL2 ERR1
131		127	SPLC CBSY CCHK CMDT RQL2 IDLE
132	type2	1CE	SPLC CBSY CCHK CMDT RQL2
133		0D3	SPLC CBSY CCHK CMDT RQL2 L2GR IDLE
134	type2	227	SPLC CBSY CCHK CMDT RQL2 L2GR
135	type1	093	SPLC CBSY CCHK CMDT RQL2 L2GR ERR1
136		149	SPLC CBSY CCHK CMDT RQL2 L2GR L2CX IDLE
137	type2	113	SPLC CBSY CCHK CMDT RQL2 L2GR L2CX
138		224	SPLC CBSY CCHK CMDT RQL2 L2GR L2CX L2DX IDLE
139	type2	3C9	SPLC CBSY CCHK CMDT RQL2 L2GR L2CX L2DX
140	type1	264	SPLC CBSY CCHK CMDT RQL2 L2GR L2CX L2DX ERR1
141	type1	109	SPLC CBSY CCHK CMDT RQL2 L2GR L2CX ERR1
142		0E9	SPLC CBSY CCHK CMDT RQL2 L2GR L2DX IDLE
143	type2	253	SPLC CBSY CCHK CMDT RQL2 L2GR L2DX
144	type1	0A9	SPLC CBSY CCHK CMDT RQL2 L2GR L2DX ERR1
145	type1	167	SPLC CBSY CCHK CMDT RQL2 ERR1
146		22E	SPLC CBSY CCHK RQL2 IDLE
147	type2	3DD	SPLC CBSY CCHK RQL2
148		357	SPLC CBSY CCHK RQL2 L2GR IDLE
149	type2	12E	SPLC CBSY CCHK RQL2 L2GR
150	type1	317	SPLC CBSY CCHK RQL2 L2GR ERR1
151		28B	SPLC CBSY CCHK RQL2 L2GR L2CX IDLE
152	type2	297	SPLC CBSY CCHK RQL2 L2GR L2CX
153		1C5	SPLC CBSY CCHK RQL2 L2GR L2CX L2DX IDLE
154	type2	00B	SPLC CBSY CCHK RQL2 L2GR L2CX L2DX
155	type1	185	SPLC CBSY CCHK RQL2 L2GR L2CX L2DX ERR1
156	type1	2CB	SPLC CBSY CCHK RQL2 L2GR L2CX ERR1
157		32B	SPLC CBSY CCHK RQL2 L2GR L2DX IDLE
158	type2	1D7	SPLC CBSY CCHK RQL2 L2GR L2DX
159	type1	36B	SPLC CBSY CCHK RQL2 L2GR L2DX ERR1
160	type1	26E	SPLC CBSY CCHK RQL2 ERR1
161		09D	SPLC CBSY CMDT IDLE
162	type2	2BA	SPLC CBSY CMDT
163	type1	0DD	SPLC CBSY CMDT ERR1
164		32E	SPLC CBSY CMDT REQS IDLE
165	type2	1DD	SPLC CBSY CMDT REQS
166	type1	36E	SPLC CBSY CMDT REQS ERR1
167		137	SPLC CBSY CMDT REQS RQL2 IDLE

FIG. 7D

seq #	error type	MISR value	state sequence
168	type2	1EE	SPLC CBSY CMDT REQS RQL2
169		0DB	SPLC CBSY CMDT REQS RQL2 L2GR IDLE
170	type2	237	SPLC CBSY CMDT REQS RQL2 L2GR
171	type1	09B	SPLC CBSY CMDT REQS RQL2 L2GR ERR1
172		14D	SPLC CBSY CMDT REQS RQL2 L2GR L2CX IDLE
173	type2	11B	SPLC CBSY CMDT REQS RQL2 L2GR L2CX
174		226	SPLC CBSY CMDT REQS RQL2 L2GR L2CX L2DX IDLE
175	type2	3CD	SPLC CBSY CMDT REQS RQL2 L2GR L2CX L2DX
176	type1	266	SPLC CBSY CMDT REQS RQL2 L2GR L2CX L2DX ERR1
177	type1	10D	SPLC CBSY CMDT REQS RQL2 L2GR L2CX ERR1
178		0ED	SPLC CBSY CMDT REQS RQL2 L2GR L2DX IDLE
179	type2	25B	SPLC CBSY CMDT REQS RQL2 L2GR L2DX
180	type1	0AD	SPLC CBSY CMDT REQS RQL2 L2GR L2DX ERR1
181	type1	177	SPLC CBSY CMDT REQS RQL2 ERR1
182		0EE	SPLC CBSY CMDT RQL2 IDLE
183	type2	25D	SPLC CBSY CMDT RQL2
184		037	SPLC CBSY CMDT RQL2 L2GR IDLE
185	type2	3EE	SPLC CBSY CMDT RQL2 L2GR
186	type1	077	SPLC CBSY CMDT RQL2 L2GR ERR1
187		33B	SPLC CBSY CMDT RQL2 L2GR L2CX IDLE
188	type2	1F7	SPLC CBSY CMDT RQL2 L2GR L2CX
189		31D	SPLC CBSY CMDT RQL2 L2GR L2CX L2DX IDLE
190	type2	1BB	SPLC CBSY CMDT RQL2 L2GR L2CX L2DX
191	type1	35D	SPLC CBSY CMDT RQL2 L2GR L2CX L2DX ERR1
192	type1	37B	SPLC CBSY CMDT RQL2 L2GR L2CX ERR1
193		29B	SPLC CBSY CMDT RQL2 L2GR L2DX IDLE
194	type2	2B7	SPLC CBSY CMDT RQL2 L2GR L2DX
195	type1	2DB	SPLC CBSY CMDT RQL2 L2GR L2DX ERR1
196	type1	0AE	SPLC CBSY CMDT RQL2 ERR1
197	type1	12A	ERR1

FIG. 7E